

TED(10)-1003 B  
(REVISION-2010)

Reg No.....  
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FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING

TECHNOLOGY-OCTOBER, 2013

**APPLIED SCIENCE-1 (Chemistry)**

(Common except DCP and CABM)

[Time:1<sup>1</sup>/<sub>2</sub> hours]

(Maximum marks:50)

**PART-A**

(Maximum marks:4)

Marks

(Answer the question in one or two sentences. Each question carries 2 marks)

1)

a) Explain neutralization reaction. Give one example?

(b) Define soft water. ?

(2x2=4)

**Answers**

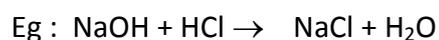
1)

(a) According to Arrhenius concept Neutralisation is the reaction of H<sup>+</sup> from acid and OH<sup>-</sup> from base form water.



**OR**

It is the reaction of acid with base form salt and water



(b) Water which Gives lather readily with soap. It does not contains dissolved impurities like Ca or Mg salt

## PART-B

(Maximum marks: 16)

(Answer any two full question .Each question carries 8 marks)

II)

(a) Magnesium metal burns in oxygen to form Magnesium oxide (MgO) as per the equation:  $Mg+O_2 \rightarrow MgO$

How many grams of oxygen are needed to react with 25 g of magnesium? How many grams of magnesium oxide will result? 4

(b) Explain the electronic concept of oxidation and reduction .Give one example. 4

III)

(a) What are buffer solutions? Give two examples? 4

(b) What are carbon nanotubes? Explain the structure of carbon nanotubes. 4

IV)

(a) Describe chemical vapour deposition method for the carbon nanotube ? 4

(b) Explain ion exchange method. ? 4

### Answers

II)

(a)  $2Mg+O_2 \rightarrow 2MgO$

48 32

25 ?

So amount of oxygen needed to react with 25g Mg is

$$= 25 \times 32 / 48$$

$$= 16.66g O_2$$

Also consider  $2Mg+O_2 \rightarrow 2MgO$

48 g 80g

25 ?

So amount of MgO formed =  $25 \times 20 / 48$

=41.66g

(b) **Oxidation:** Losing of electron is called oxidation. During oxidation, oxidation number increases ex:  $\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}$

**Reduction:** Gaining of electron is called reduction. During reduction, oxidation number decreases Ex :  $\text{Cu}^{2+} + 2\text{e} \rightarrow \text{Cu}$

III)

(a) **Buffer solution:** Solution which resist change in pH when small amount of acid or base added to it. Ex: Blood,  $\text{NH}_4\text{OH} + \text{NH}_4\text{Cl}$

(b) Its structure seemed to be formed by rolling the sheet of graphite in to the shape of cylindrical tube either closed or open at the end.

Two varieties of CNT are SWNT (Single Walled Carbon Nano Tube. It is like a single cylinder) and MWNT (multi Walled Carbon Nano Tube. It contains multiple concentric nano tube cylinder)

Based on orientation of lattice, nano tubes are Classified in to three types

1) Arm Chair

2) Zig Zag

3) Chiral

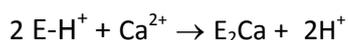
IV)

a) **Chemical Vapor Deposition Method (C V D) :** Here  $\text{CH}_4$  heated in a chamber containing Fe as catalyst at high temperature. So that C-H bond breaks form 'C' atom. This C atom bind with other C atom form nanotube lattice.

b) It can be removed by using synthetic resins like Cation exchanger  $[\text{E}-\text{H}^+]$  or anion exchanger  $[\text{E}-\text{OH}^-]$  as shown below

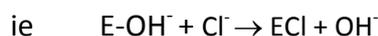
**Step 1:**

Hard water passed through a tank containing  $[\text{E}-\text{H}^+]$  so the following occur



**Step 2:**

This water coming out of cation exchanger is then passed through anion exchanger  $[\text{E}-\text{OH}^-]$





### PART-C

(Maximum marks:30)

(Answer one full question from each unit. Each question carries 15 marks)

V)

(a) Write down the molecular formula of following compounds :

(i) Sodium sulphate

(iii) Potassium carbonate

(ii) Ammonium phosphate

(iv) Aluminium chloride

4

(b) What is the volume of the solution that would result by diluting 70 ml of 0.0931 N NaOH to a concentration of 0.0150 N ?

4

(c) Explain the Lewis concept of acid and base with an example ?

4

(d) Which indicator you would adopt for the titration of  $\text{Na}_2\text{CO}_3 \cdot x\text{H}_2\text{SO}_4$  ?

give reason ?

3

OR

VI)

(a) Explain the following terms with two example for each :

(i) Radical

(ii) Valency

4

(b) What you understand about :

(i) Strong acid and strong base

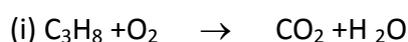
(ii) Weak acid and weak base.

4

(c) The sterile saline solution used to rinse contact lenses can be made by dissolving 400 mg. of NaCl in sterile water and diluting to 100 ml .What is the molarity of the solution ?

4

(d) Balance the following equations:

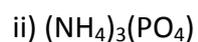
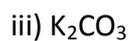
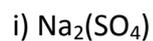


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## Answers

v)

a)



b)  $N_1V_1=N_2V_2$

$N_1=6.0913\text{N}$     $V_1=70\text{ ml}$     $N_2=0.0150\text{n}$     $V_2=?$

$N_2 = N_1V_1/N_2$

$= 0.0913 \times 70 / 0.0150$

$= \underline{426\text{ml}}$

c)	Acid	Base
	electronic pair acceptor	electronic pair donor
	electron deficient	electron rich
	Ex: $\text{H}^+$ , $\text{BF}_3$ , $\text{AlCl}_3$ , $\text{FeCl}_3$ , all cations	Ex: $\text{NH}_3$ , $\text{H}_2\text{O}$ , $\text{OH}^-$ , all anions

d) Methyl orange. Because here pH range at the point is 3.5 to 7.5

vi)

a)

i) Charged atom or atom groups are called radicals :  $\text{NH}_4^+$ ,  $\text{Cl}^-$  etc

ii) Combining capacity of an element is called valence. Ex: For Hydrogen it is 1 and for Oxygen it is 2.

b) i)

Strong Acids	Strong Bases
<ul style="list-style-type: none"> <li>➤ Acids which dissociate completely</li> <li>➤ Ex: HCl, H<sub>2</sub>SO<sub>4</sub></li> <li>➤ HCl → H<sup>+</sup>+Cl<sup>-</sup></li> </ul>	<ul style="list-style-type: none"> <li>➤ Bases which dissociate completely</li> <li>➤ Ex: NaOH, KOH etc</li> <li>➤ NaOH → Na<sup>+</sup>+OH<sup>-</sup></li> </ul>

ii)

Weak Acid	Weak Bases
<ul style="list-style-type: none"> <li>➤ Acids which dissociate partially</li> <li>➤ Ex: CH<sub>3</sub>COOH, Oxalic acid</li> </ul>	<ul style="list-style-type: none"> <li>➤ Bases which dissociate partially</li> <li>➤ Ex: NH<sub>4</sub>OH, Na<sub>2</sub>CO<sub>3</sub></li> </ul>
CH <sub>3</sub> COOH → H <sup>+</sup> +CH <sub>3</sub> COO <sup>-</sup>	ie, NH <sub>4</sub> OH → NH <sub>4</sub> <sup>+</sup> +OH <sup>-</sup>

c)  $M = \frac{W_2 \times 1000}{M_2 \times \text{Volume in ml}}$

$$W_2 = 400 \text{ mg} = 400 \times 10^{-3} \text{ g}$$

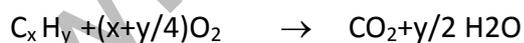
$$M_2 = \text{NaCl} = 23 + 35.5 = 58.5$$

$$\text{Vol in ml} = 100$$

$$M = \frac{400 \times 10^{-3} \times 1000}{58.5 \times 100}$$

$$= \underline{\underline{0.068 \text{ M}}}$$

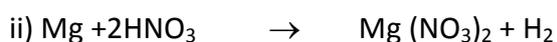
d) i) Common equation to balance combustion of Hydro carbon is



$$\text{Here } x=3, \quad y=8$$



OR



#### UNIT-II

VII)

(a) Draw a flow chart for the production of potable water for municipal supply.

(b) Explain the disadvantages of hard water.? 4

(c) What are the properties of carbon nanotubes ? 4

(d) Give any three applications of carbon nanotubes ? 3

**OR**

VIII)

(a) What are the application of nanomaterials in medicine? 4

(b) Explain the reason for temporary hardness and how it can be removed ? 4

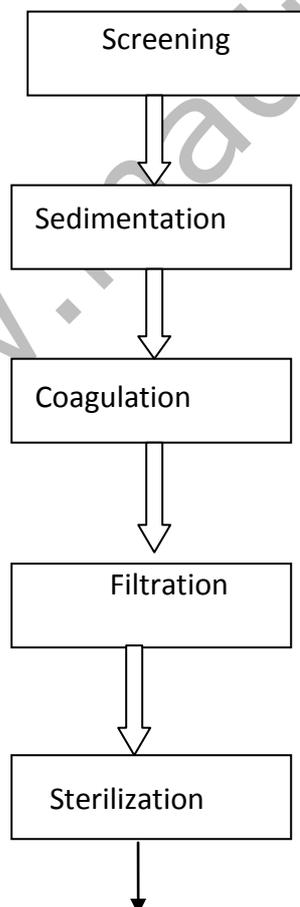
(c) What is sterilization of water? Mention the different methods of sterilization of water ? 4

(d) Explain Plasma process.? 4

**Answers**

VII)

a)



## Potable water

b)

### I) In laundry :

i) **Wastage of soap:** because While washing with hard water, soap from lather only after removing all dissolved impurities, so cause wastage of soap.

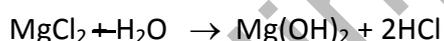
ii) It cause spot and streak on the cloth.

### II) In steam boiler :

i) **Wastage of fuel:-** Hard water cause a hard deposit on boiler called scale. It cause wastage of fuel

ii) **Cause explosion of boiler:** Due to intense heat , the scale may crack and Cause explosion of boiler (because it is a heat insulating one.)

iii) **Cause corrosion of the boiler:** Because of the formation of HCl as shown below.



### III) Not use for cooking, bathing etc.

c)

1. Very strong
2. High tensile strength & thermal conductivity
3. High Young's modulus (for force required to bent a material)
4. High electrical conductivity

d) i) In strengthen composite material. ii) Act as a molecular type test tube & capsules for drug delivery. iii) Can act as conductor & semiconductor based on their size. iv) As a tips for analysis of DNA & Proteins by Atomic force Microscopy.

OR

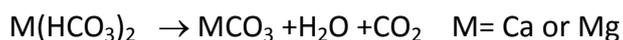
VIII)

a)

1. Act as molecular type test. tube and capsule for drug delivery

2. As a tips for analysis DNA and proteins by a atomic force microscopy.
3. Can detect an locate tumors accurately.
4. Nano shell attaching only to cancer shell and destroy tumor
5. Can deliver right amount of medicine to exact spot of the body using nano technology.

b) Temporary Hardness-It is due to  $\text{HCO}_3^-$  of Ca and Mg. it can be removed by boiling.



c) **Sterilization** it is the destroying of disease causing bacteria and micro organism using fertilizers or disinfectant like bleaching powder etc. These are

1. **Chlorination** : By passing chlorine gas or water. It need less space  $\text{Cl}_2$  available in pure form are advantages, but excess  $\text{Cl}_2$  cause unpleasant smell, taste etc.

2. **Using bleaching powder** : Mix 1Kg  $\text{CaOCl}_2$  with 1000kilo liter water. By oxidizing action of Cl , It kills the germs.

3. **By passing Ozone( $\text{O}_3$ )**. On passing  $\text{O}_3$  through water, following reaction occur.  $\text{O}_3 \rightarrow \text{O}_2 + [\text{O}]$

Here nascent oxygen produces killed the germs by oxidizing action. Its excess is not armful]

d) **Plasma Process**: Here  $\text{CH}_4$  Is passed through a plasma Torch (ie; high temperature producing substance).So that C-H bond breaks from 'c' atom binds with other 'c' atoms from nano tube lattice.